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IMPROVING THE SYSTEM FOR PROVID-
ING SPARE PARTS SUPPORT FOR NEW
MARINE CORPS EQUIPMENT

by
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Thesis
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IMPROVING THE SYSTEM FOR PROVIDING
SPARE PARTS SUPPORT FOR NEW
MARINE CORPS EQUIPMENT

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PREFACE

Procurement of equipment and weapons systems in the Defense establishment is big business--for two reasons. First, the resources required to design, develop, and procure these items are staggering. Secondly, the soundness of procurement decisions is reflected in the overall ability of the armed forces to provide effective national security. Consequently, procurement has received the fullest possible support from military and political circles to ensure that the weapons and equipment of the American fighting man are second to none.

In spite of this unanimity of purpose and support characterizing the procurement effort, there are situations in which a new weapons system can be delayed from entering service, occasionally for long periods of time, because the necessary support to maintain it in a serviceable condition over an extended period of service is not available when the equipment is ready to be placed in service. As a result the new equipment cannot be introduced, for to do so could result in a modern counterpart of the adage of the battle which was lost for lack of a nail.

The process that provides those items necessary to support a new end item of equipment for an initial period of time is "provisioning." It is every bit as complex a process as that which introduces the equipment itself, but it accounts for only a small portion of the funds required to put a complete system in the field. Accordingly the attention of top management devoted to provisioning is often far below that devoted to the

procurement process. This does not in any way alter the fact that the equipment is not truly a system until the support that is necessary to keep it functioning in a satisfactory manner is available within the respective military supply system at the level at which it is needed. Because provisioning is essential to the successful completion of the procurement function, it is every bit as important as the research, or the test and evaluation functions by which the equipment is developed.

Armed with this conviction, I launched my study of the provisioning process within the U. S. Marine Corps. The nature of my project was a complete examination of the processes and procedures by which an end item is given that support necessary to maintain it during an initial period of service--beginning at the commencement of planning, and ending when the item is delivered to the using units.

A subject of this magnitude naturally encompasses many elements of the Marine Corps organization, from the Headquarters where the end item concept is born to the force units that place the item in service. I could not, because of limitations of time and distance, undertake a detailed analysis of the practices actually employed at each location. Instead I made a careful study of the directives establishing the policy and procedures governing the provisioning process. This was supplemented by interviews and correspondence with personnel involved in provisioning at Headquarters Marine Corps, and at other Marine Corps activities that seemed appropriate.

The purpose of this research project is to determine to what extent provisioning in the Marine Corps can be improved to provide a more timely and more effective process whereby the support necessary to sustain

an end item is available when and where it is needed. In order to do this it will be necessary to look first at the backdrop of Department of Defense and Marine Corps policy, and then to take a cursory glance at the procurement process. When these have been accomplished, we will move in Chapters III and IV to an extensive review of support planning and the provisioning process itself, followed by a comprehensive study of alternative procedures which might provide a more efficient provisioning process.

I am indeed grateful for the numerous personnel who so generously gave time to assist me in this project, and without whose help I could not have accomplished the results set forth herein. Foremost among these is Mr. D. L. Bonner of the Technical Division, Supply Department, HQMC, whose expertise in provisioning is matched only by the guidance and inspiration he gave me when the task seemed insurmountable, which I must admit was frequently the case.

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CHAPTER I

POLICIES AND RESPONSIBILITIES GOVERNING

INITIAL SUPPORT ACTIONS

Department of Defense Policy

The ultimate responsibility of the Department of Defense is to ensure national security. As such, any policy emanating from the Pentagon will have this concept as its underlying principle, and will set forth the concepts and objectives that are necessary to insure the highest possible state of military readiness, the cornerstone of national security.

Equipping our forces with the best available weapons and systems is a vital factor in achieving the highest possible state of military readiness. Ensuring that the support necessary to achieve the fullest utilization and effectiveness of this equipment is another vital factor. In essence the two cannot be separated, for to consider one without the other is the most reckless course of action possible. In recognition of this basic fact, the Department of Defense has instituted certain programs that set the framework under which a new equipment or system becomes part of our materiel inventory and remains an effective equipment for the intended period of service. Foremost among these are the Integrated Logistic Support concept, the Maintenance Engineering program, and the Provisioning process.

CHAPTER I

THEORY OF THE CONSTITUTION

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Integrated Logistic Support

Integrated Logistic Support (ILS) is a composite of the elements necessary to assure the effective and economical support of a system or equipment at all levels of maintenance for its programmed life.¹ Its primary objective is to ensure that systems and equipment are systematically planned, acquired, and managed as an integrated whole to obtain maximum materiel readiness and optimum cost effectiveness. The elements of integrated logistic support are planned maintenance, technical logistic data, logistic support personnel (skills, training, safety, and performance), spares and repair parts, support equipment, and facilities. As envisioned, integrated logistic support should be characterized by a sort of harmony and coherence between each of the levels of maintenance and the elements just cited. Since provisioning is directly responsible for certain of these elements (support equipment, and spares and repair parts), it is a vital part of the dynamic functioning of an integrated logistic support program.²

Maintenance Engineering

A concept of earlier vintage, maintenance engineering grew from an early awareness of the problems engendered by the growing complexity of equipment being acquired by the Defense establishment. Foremost among these problems was the extent to which more complex equipment generated increasing demands for limited funds, facilities, materiel, and skilled manpower. In order to conserve these scarce resources, while contributing

¹U.S., Department of Defense, Development of Integrated Logistic Support for Systems and Equipments, DOD Directive 4100.35, June 19, 1964, p. 1.

²Ibid., pp. 2-3.

to overall military readiness, the maintenance engineering concept was advanced to place increasing command recognition on the scope and magnitude of maintenance operations. It called for greater emphasis in the areas of policy direction, technical supervision, and management control of major maintenance programs and activities.³

The policy direction effort is aimed at ensuring that maintenance policies, plans and procedures are evaluated periodically to ensure that they provide maximum readiness to perform designated functions efficiently and safely. The technical supervision policies are directed toward ensuring that design development and production engineering activities stress maintainability and reliability of operation, that adequate reporting systems are provided to disseminate pertinent failure data, and that policies and procedures governing initial provisioning will be reviewed and revised as necessary to assure the timely availability of maintenance support items required during the initial phase of service use.⁴

The essence of maintenance engineering then is to ensure that equipment is developed which will place the least possible requirement on the limited maintenance resources available, and to provide that the support is available when required in the supply system at the maintenance level needed. This latter function is the main objective of provisioning.

Provisioning

Initial provisioning is defined as:

³U.S., Department of Defense, Department of Defense Maintenance Engineering Program, DOD Directive 3232.1, November 3, 1955, pp. 1-2.

⁴Ibid., pp. 2-3.

the same conditions, the same results are obtained. It is therefore
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the process of determining the range and quantity of items (i.e., spares and repair parts, special tools, test equipment, and support equipment) required to support and maintain an end item of materiel for an initial period of service.⁵

Its principal objective is to assure that initial spares and repair parts (including tools, test equipment, and support equipment) are available in the supply system at the appropriate maintenance echelon when needed.⁶

In recognition of the increasing complexity and cost of new equipment, and the significant cost of providing these new equipments with uninterrupted maintenance and support, the Department of Defense prescribed certain policies to govern provisioning within the Defense establishment. These provide us with the key to the manner by which coordination will be accomplished when more than one service or agency is involved, as well as overall guidance for provisioning under single service effort. Where inter-service effort is involved, responsibilities are spelled out for both the procuring and the using services with respect to determining range and quantity, the type of technical documentation required, and data affecting contract negotiation (time, payment, delivery).

Provisioning is indeed a very complex process. Because of this it was necessary that the Department of Defense prescribe certain command relationships and set down coordination ground rules. These will not of themselves accomplish the task, but they do provide the framework within which the individual service can provide the timely support necessary to put an end item in service and maintain it.

⁵U.S., Department of Defense, Policy and Principles Governing Provisioning of End Items of Material, DOD Instruction 3232.4, April 2, 1956, pp. 1-2.

⁶Ibid., p. 2.

U. S. Marine Corps Policy

Integrated Logistic Support

In furtherance of the policy promulgated by the Department of Defense, the Secretary of the Navy assigned responsibility for the development of integrated logistic support for systems and equipments, and the monitoring of performance, to the Chief of Naval Operation, the Commandant of the Marine Corps, and the Chief of Naval Material. Specifically, the Commandant of the Marine Corps has been charged with the responsibility for determination of the requirements for the development of integrated support for systems and equipments to be accomplished by the Naval Material Support Establishment (NMSE), and for systems and equipments developed under the cognizance of the Marine Corps.⁷

Within the Marine Corps, the goal of integrated logistic support is twofold. First, only supportable equipment will be placed in service in the Fleet Marine Forces because all requirements for resources will have been identified and provided prior to placing the item in service. Second, the life cycle costs for a new equipment can be identified and its adoption can be based on these costs rather than acquisition cost alone.⁸

To achieve these goals it becomes necessary to identify all elements necessary to support a system or equipment for its full programmed life. In other words, it demands that all requirements for resources (money, manpower, materiel, data, or facilities) needed to

⁷U.S., Department of the Navy, Development of Integrated Logistic Support for Systems and Equipments, SecNav Inst. 5430.72, December 16, 1964, p. 2.

⁸U.S., Marine Corps, Development of Integrated Logistic Support for Systems and Equipments, MCO 4100.3, November 12, 1965, p. 1.

support the new item during its full intended life be identified early in the equipment design process. Specific actions that will be performed to identify these elements include:⁹

1. Development of a "plan for use" and a "plan for support" of the equipment.
2. Predict spare and repair parts requirements on an annual basis and projected over the life cycle of the equipment.
3. Estimate the requirements for support personnel by military occupational specialty (MOS) and skill level projected over the life cycle.
4. Establish a fixed ratio of performance time to maintenance time.
5. Estimate the technical data requirements.
6. Define the requirements for support equipment.
7. Determine requirements for facilities required to store, use, or maintain the item at all levels.
8. Determine requirements for contractor support, if any.

Provisioning

As defined earlier, provisioning is the process of determining the range and quantity of items necessary to support an end item of material for an initial period of service. In actuality, the process does not stop at determining the range and quantity as the definition implies, but follows the selected items through the procurement, delivery, and initial period of use during which usage data is compiled to evaluate the decisions reached earlier. Within these wider parameters, the policy

⁹Ibid., pp. 1-2 to Enclosure (2).

should not be the subject of any further action. It is the duty of the Government to ensure that the public interest is protected in all cases.

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of the Commandant of the Marine Corps outlined below takes on added significance.

Because premature introduction of new equipment prior to adequate build-up of resources could seriously detract from the capability of the force using the equipment, the Commandant's basic policy is that new items of equipment will not be put into service until using and service units have on hand specified levels of mount-out (combat) and garrison operating (peace-time) stocks, trained operators and technicians are available as needed, budgeting information for requisitioning replenishment stock has been furnished to appropriate commanders, and the first, second and third automatic resupplies are available in protected status within the supply system.¹⁰

With respect to the determination of the range and quantity of items to be provisioned, it is the Commandant's policy that:¹¹

1. General criteria for range and quantity (in terms of days of supply) will be prescribed by Headquarters Marine Corps for items to be stocked in support of end items being provisioned. Within these general criteria, the Marine Corps Supply Activity, Philadelphia will determine the range and quantity of items necessary to support the new end item for an initial period of time. That period of time extends from placing the end item in operation until adequate usage data are developed and full support responsibility can be assumed by the supply system for routine replenishment.

2. The basis for determining the range and quantity of items

¹⁰U.S. Marine Corps, Policy for Support of New Equipments Introduced into the Marine Corps, MCO 4400.32A, March 11, 1965, p. 3.

¹¹Ibid., p. 2.

to be provisioned is the experience gained from research, test and evaluation, known or factored failure rates, planned in-use quantities and deployment of the end item, and the support concept of the new equipment.

3. Quantity determinations for mount-out, resupplies, and garrison operating stocks will be expressed separately because of the different failure rates of spares and repair parts under combat and peacetime conditions, and the non-essential nature of certain items to a combat environment.

Fiscal Policy

One further area of policy which needs to be mentioned briefly is funding as it relates to Fleet Marine Force units. For end items procured as Appropriated Stores Account (ASA) items under the appropriation Procurement, Marine Corps, funds are budgeted by Headquarters Marine Corps under the appropriation Operations and Maintenance, Marine Corps, and are allotted to field commanders to provide for procurement of support items from the stock fund. For end items procured as Stock Fund Account (SFA) items, both the end item and the support items are budgeted for and funded by field commanders with allotted Operations and Maintenance, Marine Corps funds.¹² Although this procedure is in line with the Commandant's overall fiscal policy of having the field commander obligate funds for items used by him, we will encounter a conflict arising from this policy in Chapter IV which raises the question as to whether this procedure is complementary to expeditions provisioning.

¹²Ibid., p. 4.

Responsibilities for Support of New Equipment

Commandant of the Marine Corps

Overall responsibility for the support of new equipment rests with the Commandant of the Marine Corps, who will issue directives to convey his support policies, prescribe authorized levels of garrison operating and mount-out stocks, budget for the procurement of mount-out and initial garrison operating stocks for active Fleet Marine Force units. He also will establish (and adjust as necessary) the target dates for placing new items of equipment in service based on planned availability of required personnel and logistic support.¹³

Marine Corps Supply Activity, Philadelphia

Within the general criteria for range of items and stock levels prescribed by Headquarters Marine Corps, the Marine Corps Supply Activity, Philadelphia determines the range and quantity of items to be procured for initial issue and for supporting stocks within the stores system, and determines the range and quantity of mount-out and garrison operating stocks for using and supporting service units. In addition the Supply Activity advises the Commandant of estimated funds requirements at appropriate times during the budget cycle, informs the Commandant when first, second and third automatic resupplies are available in protected status within the stores system, and originates documentation necessary to process the initial issue by the Supply Centers.¹⁴

¹³Ibid., p. 5.

¹⁴Ibid., pp. 5-6.

THE HISTORY OF THE UNITED STATES

CHAPTER I

The first settlement in the United States was made by the English in 1607, when a group of men led by Captain John Smith founded the city of Jamestown in Virginia. This was the first permanent English colony in North America. The colony was established on a small island in the James River, and the settlers were given land to grow crops. The colony was successful in its first years, but it was not until 1619 that the first representative assembly was elected. This assembly was known as the House of Burgesses, and it was the first of its kind in the world. The House of Burgesses was made up of men who were elected by the settlers, and it was responsible for making laws for the colony. The House of Burgesses was a very important institution, and it played a large role in the development of the colony. It was the first step towards self-government, and it was a very important part of the history of the United States.

CHAPTER II

The second settlement in the United States was made by the Spanish in 1565, when a group of men led by Pedro Menéndez founded the city of St. Augustine in Florida. This was the first permanent Spanish colony in North America. The colony was established on a small island in the St. Johns River, and the settlers were given land to grow crops. The colony was successful in its first years, but it was not until 1673 that the first representative assembly was elected. This assembly was known as the Council of the City, and it was the first of its kind in the world. The Council of the City was made up of men who were elected by the settlers, and it was responsible for making laws for the colony. The Council of the City was a very important institution, and it played a large role in the development of the colony. It was the first step towards self-government, and it was a very important part of the history of the United States.

Marine Corps Supply Centers

As the intermediary between the producer and the user of new equipment and its support items, the Marine Corps Supply Center receives and stores the end item and its support items until the necessary initial issue documentation is received from the Marine Corps Supply Activity, Philadelphia. Upon receipt of the documentation, the Supply Center will enter the expenditure data received from using and service units, process the requisitions, assemble the initial issue end item and support items, and (as of January 17, 1966) ship the items concurrently as a package to their destination.¹⁵

Force Commanders

To ensure adequate and timely training of personnel prior to introduction of the new equipment, the Fleet Marine Force commander has the responsibility for designating the quantities of equipment to be removed from administrative deadline for training purposes, and for providing funds to support this function. He is likewise responsible for placing the end item in service when all required support actions have been accomplished, and for informing the Commandant of this action.¹⁶

Organization and Responsibilities of the Supply Department, Headquarters Marine Corps

The Supply Department, Headquarters Marine Corps is assigned a complex of responsibilities for the provisioning of new equipment being

¹⁵U.S. Marine Corps, Standing Operating Procedure for Providing an Initial Issue of Repair Parts for New Items of Marine Corps Equipment, MCO 4423.1C, November 17, 1964, pp. 5-7.

¹⁶U.S. Marine Corps, Policy for Support of New Equipments Introduced into the Marine Corps, MCO 4400.32A, March 11, 1965, p. 6.

introduced into the Marine Corps. While these will be covered in detail in Chapters III and IV, it is desirable at this time to examine the organization of the Supply Department.

The Supply Department, Headquarters Marine Corps, headed by the Quartermaster General of the Marine Corps, is organized into three separate offices and six operating divisions, as shown in Figure 1. Responsibility for support of new end items of equipment is vested in four of these divisions as follows:¹⁷

1. The Stock Management Division (CSX) is responsible for preparing Part I of the Provisioning Guidance Data Sheets, and for performing Item Management Coding for Headquarters controlled items. This is done in accordance with applicable instructions for the determination of management control by the Defense Supply Agency or the Marine Corps.

2. The Financial Management Division (CSS) is responsible for those aspects of the support process relating to funding, apportionment, and budgetary information. It also provides the Stock Management Division with an annual schedule by which the Supply Activity is furnished Provisioning Guidance Data Sheets (Part I) and Marine Corps Shopping Lists.

3. The Procurement Division (CSG) is responsible for procuring and insuring delivery of items for test and for support of the end item when adopted. They monitor progress of provisioning and notify the Stock Management Division of delivery of the end item and its related support items to the Supply Centers.

¹⁷U.S. Marine Corps, Headquarters Manual, HQO P5000.3A, May 26, 1964, Chapter 9.

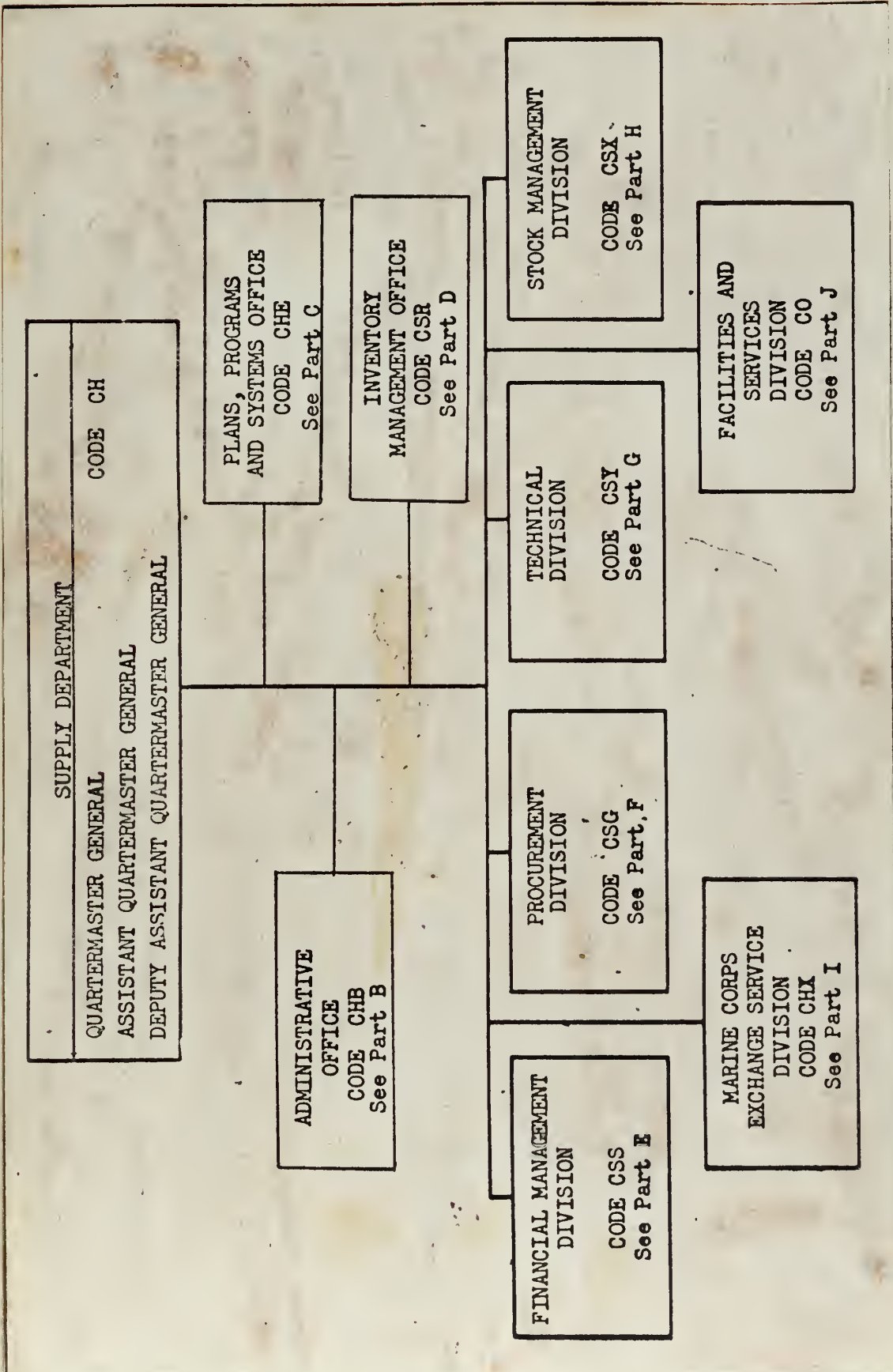


Fig. 1.--Organization Chart of the Supply Department,
Headquarters Marine Corps^a

^aSource: U. S. Marine Corps, Headquarters Order P5000.3A, May 26, 1964.

4. The Technical Division (CTY) is responsible for formulating technical policy for the acquisition, support and maintenance of ground equipment. They support Marine Corps procurement programs by providing engineering documentation as necessary, developing equipment support programs, implementing maintenance engineering policies by specifying provisioning requirements, and developing and controlling formalization of support concepts, maintenance philosophy, and provisioning guidance instructions to Marine Corps Supply Activity, Philadelphia.

CHAPTER II

FACTORS RELATING TO SUPPORT OF NEW EQUIPMENT

A new system or equipment is introduced into the Marine Corps when it has been found to meet an existing requirement, and remains in service until it no longer adequately satisfies these requirements. In order to explore fully the process by which an equipment is supported throughout this period of service, it is necessary to examine the life cycle of equipment and the support actions as they relate to this life cycle.

Life Cycle of Systems and Equipments

Planning

Planning establishes the background of military and technical requirements that precedes the formulation of a system or equipment as a definable project. It begins with the Marine Corps Long-Range Plan which projects the combat image of the Marine Corps ten to twenty years in the future. It is carried on by the Marine Corps Mid-Range Objectives Plan which looks two to ten years into the future, and provides for an orderly progression from the present combat force to the long range concept. The objectives and requirements of the mid-range plan provide the guidelines for the research, development, and studies (RD&S) program, out of which are formed projects of an applied research nature or an equipment research nature. The equipment research projects are generated

by a General Operational Requirement, which is a statement of the need for an improved equipment, system or technique which will provide a significant improvement in operational capability and contribute to combat effectiveness, if and when developed.¹

Conceptual Phase

This is the first phase of the equipment cycle. It is here that the equipment or system becomes a definable concept that can be translated into a specific technical development project. Since this phase grows out of the various research projects of the planning process, its start is not sharply defined. Its end is sharply defined, however, by the issuance of the Specific Operational Requirement, which is derived from and supports a General Operational Requirement in whole or in part. It delineates in more specific terms the functional performance desired and the limiting physical parameters. These include weight, size, speed, environmental requirements, personnel and training implications, logistical implications, and the time phasing for completion of development.²

Definition Phase

In Definition the concept of the Special Operational Requirement is translated into a detailed technical development project which leads to a full description of the desired system or equipment, in sufficient detail to permit negotiation of procurement contracts for pilot models (prototypes). This is accomplished sequentially through:³

¹U.S. Marine Corps, Policy, Guidance and Procedures for the Support of New Equipments, Draft MCO P4409, July 15, 1965, p. 1-3.

²Ibid., p. 1-4.

³Ibid., pp. 1-4 and 1-5.

1. The Technical Development Plan (TDP), which translates the Specific Operational Requirement into a detailed plan. When approved by the Commandant, it becomes authority to commence the development, procurement of pilot models, and necessary test and evaluation.

2. Marine Corps Program Documents (MCPD), which ties the equipment or system into the programming process. The appearance of a new end item here is the first identification of it as an equipment programmed for introduction into the Marine Corps. It likewise establishes priorities and guidance for the procurement, production, utilization and disposal of the equipment.

3. The Design Disclosure Package, which includes the specifications, drawings, engineering data, inspection and test procedures, and associated technical logistic data.

4. The Field Budget Guidance, which ties the new equipment into the budget process by giving phase-in schedules and allowances of new equipment for the two subsequent years.

5. The Marine Corps Shopping List, which lists annually the approved end items to be procured during the current fiscal and budget year.

Procurement Phase

This phase commences with the award of the initial procurement contracts or other procurement action, continues through the production, necessary modifications, inspection and testing, and concludes with the acceptance by the Marine Corps of the required end items.

Operational Phase

The Operational Phase of the equipment life cycle commences with the deployment of the new equipment to the Fleet Marine Forces (FMF), and continues until the equipment is withdrawn from service.

General Support Requirements of New Equipments

The overall support requirements of a new equipment can be summarized into: (1) providing for planned maintenance, (2) carrying out the required provisioning and supply actions, and (3) providing for the required personnel logistic support.⁴

Planned Maintenance

This category of support requirements takes cognizance of servicing, repair, inspection, calibration, testing, overhaul, modification, handling, and storage. Procedures are established for each new equipment to provide appropriately for these requirements, which are a major factor in developing the necessary provisioning and supply actions and for determining the required personnel logistic support.

Provisioning and Supply Actions

This set of support requirements covers both determining the range and quantity of items required to support an equipment, and supplying these items where and when they are needed. The items covered include spares and repair parts, support equipment, special tools, test equipment, and technical logistic data (technical manuals, drawings, specifications, engineering data, and other "software"). Throughout this paper, references to "spares and repair parts" or to "support items" will include the above unless exempted.

⁴Ibid., p. 1-2.

1891-1892

The first of the two years of the war was a year of great activity. The first year was a year of great activity. The first year was a year of great activity. The first year was a year of great activity.

The second year was a year of great activity. The second year was a year of great activity. The second year was a year of great activity. The second year was a year of great activity.

The third year was a year of great activity. The third year was a year of great activity. The third year was a year of great activity. The third year was a year of great activity. The third year was a year of great activity.

1893-1894

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1895-1896

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1897-1898

1899-1900

Personnel Logistic Support

Personnel logistic support takes into consideration the requirements for training and for human factors engineering--i.e., personnel skills, and safety considerations. Since it is related only indirectly to provisioning, we will focus only slightly on this aspect of support for new equipment.

Broad Support Actions in Support of New Equipments

Actions to support a system or equipment occur all through its life cycle, from the long range plan to the disposal of that equipment. However, inasmuch as an item is considered a "new equipment" only for that portion of the Operational Phase during which significant usage data is being accumulated,⁵ any actions subsequent to that time are a function of normal Marine Corps logistics and will not be considered within the scope of this paper. In addition, since support actions during Planning and the Conceptual Phase are limited to the recognition of logistic support implications and introducing these into the Special Operational Requirements, these will likewise be considered only in passing. The emphasis herein will be in proportion to the support effort found in each phase of the life cycle--i.e., the concentration will be on the Definition, Procurement, and Operational (first year only) Phases.

Definition Phase

The principal support actions during this phase are centered around the documents cited earlier. Appropriate provisions regarding the logistic support characteristics of the new equipment are introduced into the Technical Development Plan under specific sections for maintenance, provisioning

⁵Ibid., p. 1-5.

and supply, and personnel. Likewise, information which reflects how it is planned to support the equipment with respect to planned maintenance, provisioning and supply, and personnel logistic support is collected from the Technical Development Plan, Marine Corps Program Documents, and the Field Budget Guidance. This information is processed to provide documentation specifically for the purpose of planning logistic support actions for the new equipment.⁶

A plan for management control of all support actions is also prepared during the Definition Phase to provide for centralized scheduling, evaluation of progress, and implementation of measures to ensure the efficiency and effectiveness of the many support actions concerned. In addition, procurement action may be started for certain items which involve long lead times, high costs, or certain other considerations, where to delay procurement could delay the introduction of the end item.

Procurement Phase

Procurement might best be described as the transition from the development to the production stages. The contract which heralds the commencement of procurement contains provisions under which the later procurement of support items will be made, and sets in motion the sequence of events by which these support items will be acquired. This sequence of events includes the submission of provisioning documentation, selection of the range and quantity of items required, monitoring of the contractor's progress in meeting the timetable, and delivery of the support items to the Supply Center. Concurrently with this process, the necessary training curricula are developed and personnel are trained to operate the new equipment when it is placed in service.

⁶Ibid., p. 1-6.

Operational Phase

Since all new equipment is placed in service under an interim support plan, the main emphasis during the initial period of service is to supervise and evaluate the interim plan toward establishing firm support requirements under which the equipment will function for the remainder of its programmed life. The supervision effort is directed primarily toward ensuring the adherence to the procedures set up for planned maintenance, provisioning and supply, and personnel logistic support. The evaluation effort is directed toward collecting operational usage data upon which to base firm support requirements and to ensure a smooth transition to normal logistic support beyond the initial period of service covered by the provisioning process.⁷ Evaluation likewise constitutes an appraisal of the accuracy of the provisioning decisions, and a feedback mechanism to initiate changes to the supply levels determined as part of the provisioning process.

In the chapters which follow, the main emphasis is directed toward evaluating the timeliness of the processes involved rather than assessing the accuracy of the range and quantity decisions. Therefore, the detailed examination to follow will concentrate on those support actions performed during Definition and Procurement, while bearing in mind that the Operational Phase will provide what corrective action is necessary to compensate for differences between the compiled usage data and the assumed replacement factors used during provisioning.

⁷Ibid., p. 1-7.

CHAPTER III

SUPPORT PLANNING PROCEDURES

The Integrated Logistic Support concept demands that all resources needed to support an end item of equipment be identified early in the design stages of equipment development.¹ This means that a maximum of coordination and interplay must be established early between those offices responsible for research and development, production, maintenance, provisioning, and supply, in order that the requirements of each can be recognized and incorporated into the larger framework of the total resource requirements of the system.

In this chapter we examine the procedures that provide the information and coordination necessary for later execution of the provisioning and supply actions. For sake of identification this overall set of procedures is termed "support planning." However, planning actually carries over into the execution of end item procurement and provisioning, and conversely certain portions of execution (procurement of high-cost or long lead-time items) may begin even before the procedures covered in this chapter have been accomplished.

The principal vehicles presently used to provide the background and coordination necessary for timely and effective support of new end items are the Item Management Plan (IMP), the test and evaluation process,

¹Supra, p. 5.

the Letter of Adoption and Initiation of Procurement (LAP), the Support Concept (SC), the Provisioning Guidance Data Sheet (PGD), and the Procurement Work Order (PWO). Each of these will be examined to determine how it is presently utilized to support the introduction of a new item of equipment, and the entire process will then be evaluated in Chapter V to determine wherein the procedures could be simplified or executed in a more timely manner.

Item Management Plan (IMP)

The Item Management Plan (IMP) is a record of all key actions that must be completed prior to introduction of the new item of equipment into service. As such it is the basic source of management information within Headquarters Marine Corps for scheduling and evaluating progress in providing the required support for the new equipment.² Progress is indicated by means of the "milestone" technique--i.e., each significant action is recorded as a milestone, and dates for scheduled completion, review, and revised scheduled completion are plotted opposite the action indicated. By means of this procedure an immediate analysis is available at all times of the current status of each significant element of each program. A blank IMP form is shown as figure 2.

Responsibility

The basic responsibility for initiating action to prepare an Item Management Plan is assigned to the Assistant Chief of Staff, G-4.³

²U.S. Marine Corps, Responsibility, Coordination and Review of All Actions Required to Support New Items of Equipment Introduced into the Marine Corps, HQ 4400.1, December 24, 1964, p. 1 to Enclosure (1).

³Ibid., p. 2.

Subordinate responsibilities are assigned as follows:⁴

1. G-4 Division

- a. Preparation of the IMP for each new system or equipment.
- b. Coordination with other internal Headquarters Marine Corps units to determine the specific elements to be charted and reported.
- c. Maintaining the IMP for regular and periodic presentation to the Assistant Chief of Staff, G-4 and other staff members to indicate up-to-date status of representative programs.

2. Supply Department

- a. Assisting the G-4 Division in initial preparation of the IMP by selecting reporting elements and determining the time element required to complete the action.
- b. Developing subsidiary IMPs to support prime IMPs and establishing necessary reporting system to provide for updating.
- c. Provide necessary liaison with the Marine Corps Supply Activity, Philadelphia to insure that actions specified in an IMP are completed on time.

3. Other Divisions and Staff Organizations.-- As required by the G-4 Division, assist in the development of the IMP reporting elements for a specific program, and develop and maintain subsidiary IMPs to insure responsive action to comply with the objectives of the prime IMP.

Preparation Procedures

The Item Management Plan is prepared to record and indicate the status of action from the date an equipment is being considered for use until it is eventually placed in service. Actual preparation is the responsibility of the G-4 Division, which normally calls a meeting of the

⁴Ibid., p. 1 to Enclosure (2).

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various staff sections concerned to select the appropriate milestones.⁵ These are then assigned to the cognizant staff office for completion of the time schedule, and for monitoring the progress of the action.

Milestones selected should represent key points in the equipment development process, and are significant in that failure to accomplish the indicated action on time may have an adverse effect on the timely introduction of the equipment. Some of the typical key points normally reported include development or completion of the military and operational requirements, design study, experimental model, test and evaluation process, letter of adoption, contract negotiations, delivery of the end item, provisioning, and release of the advanced logistics data.⁶ An individual IMP may also contain other milestones; however, unless they are significant management steps as seen at the Assistant Chief of Staff, G-4 level, it is normal for the respective staff section to prepare a subsidiary IMP and include the lesser milestones therein for its own use.

Reporting and Updating

The Item Management Plan becomes an effective tool of management when the milestone actions have been determined, responsibility for completing the actions have been assigned (and accepted), and the time schedule for completing each action has been projected. It remains an effective tool only if the progress is recorded in such a manner that it is at all times current and reflects accurately the status of all facets of the project.

No specific procedures for gathering status data are prescribed. Instead the responsible branch in the G-4 Division performs the necessary

⁵Ibid., p. 1 to Enclosure (3).

⁶Ibid., p. 1 to Enclosure (4).

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liaison with the action offices indicated in the "responsibilities" blocks of the IMP to obtain data necessary to update the plan.

Each IMP is updated as events are completed or rescheduled. For all actions that are rescheduled, the reasons are indicated and an analysis made of the subsequent effect this delay will have on the program. For those actions yet to be completed at any time, a forecast is maintained as to the probability of meeting the deadline, and the anticipated implications if this outlook is poor.⁷ By maintaining the IMP in this way, a review at any time indicates the overall status of the project, and additionally pinpoints those areas where added attention is indicated.

Test and Evaluation Process

One of the action milestones of any equipment program is the test and evaluation process, which often takes up a major portion of the time frame from Definition to delivery.

Initial test and evaluation of most new equipments is performed at the Marine Corps Landing Force Development Activity, Quantico. It begins with the procurement of one or several pilot models from firms which responded by submitting proposed designs based on characteristics outlined in the Technical Development Plan (TDP). These pilot models are tested to determine how well they satisfy the military and operational requirements specified for the equipment. From this initial testing is developed an advanced model which may be a modification of one of the prototypes or a new generation equipment which incorporates the better features of several pilot models.⁸

⁷Ibid., pp. 2-3.

⁸Interview with Mr. D. L. Bonner, Supply Department, H&MC, various dates.

In keeping with the concept of Maintenance Engineering, the basic design finally arrived at must be one combining maximum operational capability and a minimum of maintenance requirements. To determine the amount of maintenance support required, and fully to evaluate the operability and maintainability of the design, each equipment is tested and refined until it appears that it completely satisfies the requirements indicated. At this point the equipment is sent to the Fleet Marine Force for further testing under actual operating conditions. Throughout both test stages a complete record is compiled of each part or component which fails, and an evaluation is made of the probable reason for failure--e.g., age, defective design, unusual stress, or intentional overloading. These data become a vital factor in the provisioning process, and will show up repeatedly in the process of determining adequate support for the new equipment.

Letter of Adoption and Initiation of Procurement (LAP)

The Letter of Adoption and Initiation of Procurement (LAP) is a time-phased, four-part document designed to augment the Item Management Plan (IMP) by providing for the timely dissemination of information at key stages of development from Planning to Introduction.⁹ By this time sequence of presentation, the necessary information and authorization to support planning and execution of procurement is provided as soon as the data becomes available.

Part 1 of the LAP (Planning Phase) indicates the nomenclature of the item, the type of funding to be utilized, the estimated unit cost,

⁹U.S. Marine Corps, Procedure for Adoption and Initiation of Procurement of Equipment for Marine Corps Use, HQO 4120.2A, June 30, 1965, p.1.

planned allowances, anticipated replacement factors, and a brief description of its intended use and characteristics. This description should include physical and operational (but not technical) characteristics.¹⁰

Part 2 (Budgeting Phase) presents the planned procurement and phase-in schedule, life expectancy, maintenance factors, anticipated organizational changes, estimated date of approval for service use, and any changes to the data disseminated in Part 1. Included under the heading "maintenance factors" is a complete list of parts usage during both the Development Activity and troop test programs, the probable reasons for each failure, any special tools and test equipment required, and the training levels required of personnel to operate and service the equipment.

Part 3 (Procurement Phase) is prepared when the equipment has undergone sufficient testing and operational evaluation, and is considered suitable for Marine Corps use. This evaluation must be performed on a model which is "functionally and physically equivalent to a final production model," and will insure that the model adequately meets the technical, operational, reliability, maintenance, and personnel requirements specified under actual service conditions.¹¹ When this has been accomplished, Part 3 is issued. This states that the equipment has been adopted for Marine Corps use, and it presents the nomenclature, model number, common name, and physical dimensions of the equipment, and any changes to Parts 1 and 2.

Part 4 (Allowance Documentation) is released when the end item is ready for issue to the using units. It prescribes those units authorized the equipment and the quantity rated by each, and is the authorization

¹⁰Ibid., p. 1 to Enclosure (1).

¹¹Ibid., p. 5.

for inclusion of this information into the appropriate Table of Allowances or Table of Equipment.

Responsibility

Overall responsibility for issuing the LAP rests with the Assistant Chief of Staff, G-4 who is likewise responsible for approving items of equipment for Marine Corps use.¹² In furtherance of this responsibility, the G-4 Division Technical Branch having development cognizance over the equipment will be responsible for initiating Parts 1 through 4 of the adoption letter, and for insuring compliance and completion of the required actions. Specifically, these actions include insuring:¹³

1. that no new equipment or system (or significantly redesigned equipment) is approved for Marine Corps use until the equipment has been properly tested, designed and engineered for production;

2. that an operational evaluation (service test or troop test) is conducted prior to approval for service use on all new equipment;

3. that models of such design and configuration as to be functionally and physically equivalent to a final production model be used to determine the ability of the equipment to meet the technical performance requirements, the ability of the equipment to meet the operational performance requirements in a service environment, the serviceability and maintainability of the equipment, the adequacy of documentation to support competition for production, and the reliability of the equipment; and

4. that the pilot produced equipment adequately meets the technical, operational, reliability, maintenance, and personnel requirements under service or simulated service condition.

¹²Ibid., p. 2.

¹³Ibid., pp. 4-5.

In view of the complexity of the actions upon which the LAP is based, their completion cannot be accomplished within the G-4 Division. Instead it requires the coordinated efforts of G-4 Division, the Deputy Chief of Staff for Research, Development and Studies, the Landing Force Development Activity, and the Supply Department.¹⁴ This interaction and coordinated effort will be seen repeatedly throughout the process of introducing a new equipment and providing for its support.

The Support Concept¹⁵

The Support Concept (SC) is a planning document issued by the Supply Department for each new item of equipment which is of major logistical significance. It enlarges upon the planning information contained in the LAP, defining in detail how it is planned to support the new equipment with respect to planned maintenance, provisioning and supply, and personnel logistic support. Its purpose is to provide detailed guidance for the implementation of integrated logistic support for each new equipment.

The Support Concept is issued in two parts. Part 1 is designed to supplement the information contained in Part 1 of the LAP, and serves to support planning and implementation of required initial procurement actions, especially those with long lead-time or high cost support items. Part 2 is designed to supplement the information contained in Parts 2 and 3 of the LAP, and serves to support in a general way the planning and procurement of logistic support items.

¹⁴Ibid., p. 2.

¹⁵U.S. Marine Corps, Policy, Guidance and Procedures for the Support of New Equipments, Draft MCO P4400, July 15, 1965, Chapter 33.

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Responsibility

The Technical Division of the Supply Department is responsible for the preparation of all Support Concepts. Coordination with other Headquarters activities is effected as necessary to ensure that all appropriate logistic support requirements are provided for, and with the Marine Corps Supply Activity, Philadelphia prior to publication.

Preparation

A Support Concept is prepared for each new item of equipment, except in those cases of extreme simplicity which clearly indicate that a formal concept is not needed. The complete Support Concept consists of Parts 1 and 2 explained above, and the Support Concept Master Schedule. Part 1 is prepared when the item first appears in the Marine Corps Program Document. Part 2 is issued when the item has undergone sufficient testing and has been approved for Marine Corps use; however, it could be prepared in the early stages of development.¹⁶ The Master Schedule is a supporting document to the Item Management Plan, and is prepared at that time.

Provisioning Guidance Data Sheet¹⁷

The Provisioning Guidance Data Sheet (PGD) is prepared for each item on the Marine Corps Shopping List for which initial or follow-on provisioning is required. It is the authoritative document furnished to the Marine Corps Supply Activity, Philadelphia for guidance on the provisioning of new items. It provides information relative to planned allowances of the end item, planned operational readiness date, phase-in schedule,

¹⁶Interview with Mr. D. L. Bonner, Supply Department, HQMC, various dates.

¹⁷U. S. Marine Corps, Policy, Guidance and Procedures for the Support of New Equipments, Draft MCO P4400, July 15, 1965, Chapter 34.

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and maintenance/overhaul factors. The PGD along with the Support Concept forms the basic guidance for the provisioning decisions relating to range and quantity of support items needed.

Responsibility

The Supply Department is responsible for the preparation of the Provisioning Guidance Data Sheet, which is issued in two parts. The Stock Management Division begins preparation on Part 1 as soon as the end item appears in the Marine Corps Program Document. When the item is listed in the Shopping List, this part is completed and a copy of Part 1 is forwarded to the Marine Corps Supply Activity, Philadelphia. Part 2 is prepared by the Technical Division upon receipt of the Procurement Work Order (PWO), and it is appended to the PWO along with Part 1.

Procurement Work Order

The Procurement Work Order (PWO) is a document for detailing the applicable funding, coding, performance, and delivery data required for the documentation and implementation of all end item procurements originating at Headquarters Marine Corps. When completed and accompanied by the required supporting documents, it serves as the vehicle for implementing required action for provisioning and the initial issue of logistic support items.¹⁸

Responsibility

Preparation of the Procurement Work Order is the responsibility of the Supply Department, and it is effected by the coordinated effort of several of the divisions of this department. The PWO originates in the

¹⁸Ibid., p. 410-2.

Financial Management Division which supplies funding data pertinent to the end item being procured and the support items. The Stock Management Division then examines the requirements to determine what items are available within the Department of Defense supply systems. Finally, the Technical Division prepares and attaches to the PWO the necessary supporting documents--Part 2 of the Provisioning Guidance Data Sheet, and the Technical Requirements Addendum. The Technical Requirements Addendum provides details relative to specifications, preservation and packaging of the end item, requirements for provisioning documentation, special tools and test equipment, and personnel training.¹⁹

When the supporting documents have been prepared and appended to the PWO, it portrays all necessary details for effecting procurement of the end item and for provisioning. In effect it is a procurement package, and under this name it is forwarded to the contracting officer to assist him in contract preparation. The contract, which marks the start of the Procurement Phase of the life cycle, triggers the sequence of events by which provisioning is accomplished. This sequence is the subject of the next chapter.

¹⁹Interview with Mr. D. L. Bonner, Supply Department, HQMC, various dates.

CHAPTER IV

DECISION TO DELIVERY — A LONG HARD ROAD

The process by which a system or equipment evolves from the Conceptual Phase of the life cycle to the point where it is approved for Marine Corps use is a slow one, as seen in Chapter III. Yet when this approval is given, the entire process of procuring the equipment and provisioning for its support still lies ahead. These efforts take up only about one third of the four to six years inherent in most equipment projects,¹ but many of the critical decisions and problem areas are encountered in this realm, any one of which could result in failure to achieve the target date for introduction of the new equipment.

In this chapter we will examine the complex of procedures that starts at the acceptance of the end item design and carries through to the delivery of that end item with its required support. In a broad sense these procedures can be categorized into pre-provisioning actions, the provisioning process, and the initial issue process. It is in this context that we will examine the procedures involved.

Pre-Provisioning Actions

Initiation of End Item Procurement

Procurement of the equipment begins with the issuance of Part 3

¹Presentation by Mr. D. L. Bonner, Inventory Management Officer, Technical Division, Supply Department, HQMC, to the Marine Corps Command and Staff College, Quantico, Virginia, scheduled for February 1, 1966.

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THE STATE OF NEW YORK

IN SENATE,
January 1, 1891.
REPORT
OF THE
COMMISSIONERS OF THE LAND OFFICE,
IN ANSWER TO A RESOLUTION PASSED BY THE SENATE,
MAY 1, 1890.
ALBANY:
J. B. LIPPINCOTT & CO., PRINTERS,
1891.

COMMISSIONER OF THE LAND OFFICE

James C. Thompson

ALBANY, N. Y., JANUARY 1, 1891.
PUBLISHED BY THE COMMISSIONER OF THE LAND OFFICE,
J. B. LIPPINCOTT & CO., PRINTERS, ALBANY, N. Y.

of the LAP, and may take one of several forms depending on the category of the equipment. For example, it may be in a category of items (e.g., cargo handling equipment) which is Defense Supply Agency procured, it may be in a category of items (e.g., automotive equipment) for which the Marine Corps has obtained a cross-servicing agreement for procurement, or it may be an item which will be procured by the Marine Corps. In each instance it is the individual actions rather than the overall procedure which will vary, so for the sake of simplicity I shall concentrate on those procedures utilized for items procured by the Marine Corps, bearing in mind that specific actions may vary under certain conditions.

For Marine Corps procured items the Supply Department, Headquarters Marine Corps will invite bids from prospective contractors, evaluate each bid on the basis of a technical and cost appraisal of the proposal, and award the contract to the party who can best meet the Marine Corps requirements on this basis. Incorporated into each contract is a statement of the initial provisioning requirements, which provides information concerning required documentation, specifications, and the initial conference.

Pre-Provisioning Conference

The Marine Corps Supply Activity, Philadelphia (MCSA) requires a pre-provisioning conference to be held within twenty days after contract award for purposes of contractor indoctrination, and to facilitate timely preparation of accurate and timely technical documentation.² This conference, held at the Supply Activity or a location designated by the contractor, covers the type and quantity of documentation required, and determines a

²U.S. Marine Corps, Marine Corps Provisioning Procedures and Technical Documentation Requirements, MIL-M-17993D(MC), October 1, 1961, p.9.

schedule for completion of the major provisioning actions. It is attended by the contractor team, and provisioners from the Supply Activity.

The establishment of a uniform provisioning performance schedule for each commodity area is one of the objectives outlined in the Department of Defense provisioning policy directive,³ yet to develop a standard schedule which will apply to all provisioning evolutions is impossible. Approaching this ideal, we have a skeleton performance schedule (Figure 3) utilized by the Supply Activity which indicates the typical times required for each major action. This is modified at the pre-provisioning conference to take into account any special conditions which apply to the particular situation. Thus in effect we have a uniform schedule which is tailored as needed.

Provisioning Technical Documentation

Documentation is the other major area covered at the pre-provisioning conference. By provisioning technical documentation is meant:

that documentation furnished by contractors to a Department of Defense activity which is used by the activity for the identification, determination of initial requirements, cataloging, and contractual formalization of items to be procured through the provisioning process.⁴

As it is used in the Marine Corps, documentation refers to, but is not limited to, Provisioning Lists, Long Lead Items List, Vendor Items Cards, Priced Repair Parts Orders, Federal Item Identifications, supporting drawings, illustrations, and changes thereto required in connection with

³U.S., Department of Defense, Policy and Principles Governing Provisioning of End Items of Material, DOD Instruction 3232.4, April 2, 1956, p. 3.

⁴U.S., Department of Defense, Uniform Technical Documentation for Use in Provisioning of End Items of Material, DOD Instruction 4151.7, January 29, 1961, p. 1.

BASIC PROVISIONING PERFORMANCE SCHEDULE

EQUIP: _____

CONTRACTOR: _____

DEL. DATE: _____

CONTRACT NO. _____

PRE-PROVISIONING ACTION	CALENDAR DATE
PRE-PROVISIONING CONFERENCE HELD	_____
LONG LEAD ITEMS LIST RECEIVED AT MCSA	_____
SAMPLE PROVISIONING LIST	_____

PROVISIONING ACTION	NORMAL PROVISIONING SCHEDULE	ADJUSTED SCHEDULE	CALENDAR DATE
RECEIPT OF COMPLETE PROVISIONING DOCUMENTATION OR FINAL INCREMENT. (3.2.4)	0 BEGIN	BEGIN	_____
ACCEPTANCE OF COMPLETE PROVISIONING DOCUMENTATION OR FINAL INCREMENT. (3.2.4)	10	10	_____
PROVISIONING CONFERENCE HELD CONTRACTOR FURNISHES MARKED-UP PRELIMINARY ILLUSTRATIONS (IF NOT FURNISHED CONCURRENTLY WITH PL)(3.7)	20 BEGIN VARIABLE END	20 BEGIN END	_____
CONTRACTOR FURNISHES ADDITIONAL DOCUMENTATION REQUIREMENTS MADE KNOWN AT THE PROVISIONING CONFERENCE. (3.7.3)	30	105	_____
CONTRACTOR ADVISED OF APPROVAL OR DISAPPROVAL OF PRELIMINARY ILLUSTRATIONS.	40	30	_____
REPAIR PARTS ORDER FORWARDED TO CONTRACTING OFFICER ITEM IDENTIFICATION REQUIREMENTS CONFIRMED IN WRITING BY MCSA. (3.8 AND 3.6.2.5 RESPECTIVELY)	50	205	_____
FINAL ITEM IDENTIFICATIONS FROM CONTRACTOR.	60	15	_____
FINAL ILLUSTRATIONS FROM CONTRACTOR.	75	45	_____
FINAL FEDERAL STOCK NUMBERS TO CONTRACTOR (3.6.2.7) RPL CUT-OFF DATE (3.11)	105	105	_____
PRICED REPAIR PARTS ORDER TO MCSA (3.4.5)	120	15	_____
RPL'S FORWARDED TO CONTRACTOR FOR SHIPMENT WITH THE END ITEM (IF REQUIRED)	130	10	_____
DELIVERY OF FIRST END ITEM	199	65	_____
NEW END ITEM DELIVERY DATE IF CONCURRENCY IS REQUIRED	205	10	_____

SIGNATURES:

CONTRACTOR'S REPRESENTATIVE

MCSA REPRESENTATIVE

DATE: _____

Fig. 3.--Skeleton Provisioning Performance Schedule²

²Source: U. S. Marine Corps, MIL-M-17993D(MC), October 1, 1961.

provisioning.⁵

The submission of technical documentation is a crucial point in the provisioning process, because the process begins with the receipt of adequate acceptable documentation by the Supply Activity.⁶ Recognizing this vital area, the Marine Corps makes the matter of contractor orientation with respect to data preparation a subject of concentrated attention, commencing at the pre-provisioning conference and continuing through the provisioning process by direct assistance as needed.

Of the documents mentioned in the above description, the Provisioning List has by far the widest use and application. It lists all components, assemblies, subassemblies, and parts of the end item and supporting equipment, and shows their relationship to the end item. It also provides much of the information upon which the range and quantity decisions are based. In effect, it is the "program" which shows all the players on all teams, and the vital characteristics of each--production lead time, shelf life, recommended overhaul and replacement factors, proposed unit price, and the quantity per end item. These and many other items are needed before determination of the range and quantity of items needed can be made. When the Provisioning List and all other documentation has been received, the Supply Activity notifies the contractor within ten days of either acceptance of the package or to the extent that documentation is inadequate. Once all documentation is found adequate, the date for the provisioning conference will be determined, thus commencing provisioning.

⁵U.S. Marine Corps, Marine Corps Provisioning Procedures and Technical Documentation Requirements, MIL-M-17993D(MC), October 1, 1961, p. 7.

⁶Ibid., p. 10.

The Provisioning Process

The conference which initiates provisioning is in many respects the culmination of all procedures previously discussed, for it is here that the products of these procedures are considered in concert for the purpose of determining what items are required to support the equipment for an initial period. Policy, the Support Concept, test and evaluation findings, the contractor's recommendations, technical documentation, a pre-production model of the end item--all are considered in this delicate yet complex effort which signifies the provisioning conference.

The Contractor's Responsibilities⁷

Unless otherwise specified in the contract, the contractor will bring to the conference (in addition to a team of qualified personnel) a complete set of drawings, and either an operable end item, a sample of each part, or both (as agreed at the pre-provisioning conference). He should be prepared to substantiate his recommended spare parts list, and should point out to the provisioners those components, assemblies or sub-assemblies, which require special tools, so that they can determine whether to provision the tools and parts or the assemblies.

Marine Corps Supply Activity Responsibilities⁸

The Supply Activity will likewise bring to the conference a team of qualified representatives (equipment specialists and supply personnel) who will establish source, maintenance and recoverability (SMR) coding, tentative spare parts requirements, and item identification requirements. In addition the provisioners will indicate those items they determine are

⁷Ibid., p. 36.

⁸Ibid., p. 37.

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required to support the end item which the contractor had not recommended, so that he can prepare necessary documentation.

SMR Coding

SMR coding is the process of assigning source, maintenance, and recoverability codes to each item of supply which indicates the source of supply for that item, its maintenance implications, and its recoverability status. The objectives of SMR coding are to control the range of parts required to support a new equipment for an initial period of service, and to expedite the maintenance and repair of equipment by providing maintenance and supply personnel with the information they must have to perform their tasks.⁹ Although presently performed at the provisioning conference, this evolution could be performed prior to the conference or even in connection with the test and evaluation process, if coordinated with Supply Activity personnel.

Determining Range and Quantity of Items

This task represents the heart of the provisioning process and thus is the focal point of the conference. In preparation for this effort, the contractor submits projected overhaul and replacement rates for each part of the end item, and a recommended parts list. The provisioners, guided by experience with similar items and the results of the test and evaluation process, will consider the data presented by the contractor and other factors to determine which items should be provisioned. Among the "other factors" considered are the availability of the item from commercial sources, the number of end items being procured, the failure rate of the

⁹U.S., Department of Defense, Source, Maintenance, and Recoverability Codes, DOD Instruction 3232.5, November 27, 1956, p.2.

item, and the essentiality of the part to the end item.¹⁰

The quantity of each to be procured must be sufficient to provide for anticipated needs during the period of initial service while sufficient usage data is being compiled. Since the usage data accumulation period is normally one year, the quantity of items to be procured must satisfy the requirements for initial issue of parts with the equipment, automatic re-supply levels for combat, and a one-year system stock level.

Provisioning Screening

Once the range and quantity of spare parts has been determined, the Supply Activity applies provisioning screening to all items being considered for procurement. This is:

an operation within the provisioning process whereby manufacturer's part numbers are screened against data maintained in the master Federal Catalog Data Files for purposes of revealing their association with, and validation of, existing Federal stock numbers.¹¹

Its purpose is to assist in limiting the entry of items into the supply system to those necessary to support operational requirements by determining the availability of assets in long supply and those which have an existing Federal stock number (FSN). In effect it is designed to prevent like items being carried in the supply system under more than one FSN, and the procurement of additional quantities of items which are already in long supply in the Defense supply systems.

Procurement of Support Items

Procurement of support items is similar to end item procurement in that there are several courses of action to be taken depending on the nature

¹⁰U.S. Marine Corps, Policy, Guidance and Procedures for the Support of New Equipments, Draft MCO 24400, July 15, 1965, p. 41-3.

¹¹U.S. Marine Corps, Provisioning Screening, MCO 4423.15, December 14, 1965, p. 1.

of the items. For items which are to be retained under Marine Corps management coding, the Supply Activity initiates procurement action for those currently in the supply system, and sends a Repair Parts Order to Headquarters Marine Corps which initiates procurement action with the end item contractor for those not currently in supply under previous contracts.

For items which are presently item management coded to the Defense Supply Agency (DSA) or are being recommended for item management coding to DSA, the Supply Activity prepares a Supply Support Request (DD Form 1149) by which DSA is requested to procure and stock these items.¹² Under this arrangement, DSA funds are used for the procurement and are reimbursed at the time of issue to the Marine Corps by MILSTRIP requisition.

Provisioning Requirements Record (PRR)

The Provisioning Requirements Record is a system used by the Supply Activity to record provisioning requirements and control data for repair parts and special tools required to support end items of equipment for an initial period. Requirements are fed into the computer throughout the period that the range and quantity of items is being determined; however, as far as possible all requirements should be inserted eight months prior to the projected ready-for-issue date.¹³ At that point, and monthly thereafter, supportability tests are conducted so that deficiencies can be identified and immediate follow-up action taken to insure availability of material when required.¹⁴ When the program indicates that all required support is available within the supply system, initial issue can commence.

¹²U.S. Marine Corps, Provisioning Procedures Manual, MCO P4423.8, January 28, 1965, p. 6-3.

¹³Ibid., p. 2-3.

¹⁴Interview with Mr. D. L. Bonner, Supply Department, HQMC, various dates.

The Initial Issue Process

An initial issue provides garrison operating (peacetime), mount-out (wartime), and mount-out augmentation stocks of repair parts and special tools to Fleet Marine Force using and service units in the range and quantity necessary to support a new equipment for a specified period of time under both peacetime and wartime conditions.¹⁵

The quantity of items to be provided as initial issue is determined by the predicted consumption within the time level (in terms of days) of stock authorized the particular unit. Predicted consumption should be that reasonably anticipated within the number of days for which stockage is authorized, and should not include safety elements to provide one hundred per cent assurance against contingencies and "stock outs."¹⁶

Computing Initial Allowances

Prescribed stockage levels for each organization are computed as predicted consumption, based on the number of end items supported by the organization within the number of days for which stockage is authorized. In computing garrison operating and mount-out stock, stock levels are determined by multiplying the replacement factor (failure rate) by the quantity used per end item, times the number of end items supported by the organization, times the authorized day level of stockage expressed in months, divided by twelve (since replacement factor expressed in terms of failures per year).¹⁷

¹⁵U.S. Marine Corps, Standing Operating Procedure for Providing an Initial Issue of Repair Parts for New Items of Marine Corps Equipment, MCO 4423.10, November 17, 1964, p. 2.

¹⁶Ibid., p. 3.

¹⁷U.S. Marine Corps, Standing Operating Procedures for Computing Initial Allowances of Repair Parts for New End Items of Equipment, MCO 4423.10, May 4, 1965, p. 2.

The quantity determinations for garrison operating, mount-out, and resupply stocks are expressed separately to facilitate determining when the necessary quantities are on hand at the Supply Centers to effect initial issues to authorized organizations. When the required level is achieved, Headquarters Marine Corps directs the Supply Activity to release the initial issue decks and listings (explained below).

Marine Corps Supply Activity Procedures

From the data stored in the Provisioning Requirements Record, the Supply Activity prepares single line item requisition cards and tailored listings for each using and service unit authorized an initial issue. When directed by Headquarters Marine Corps, the initial issue cards and listings are distributed to the supply centers, the units authorized the issue, and to the Fleet Marine Force commander.¹⁸

The initial issue cards as distributed by the Supply Activity do not constitute valid requisitions because they do not contain job order numbers (JONs) by which authority is given to expend funds against a specific appropriation. Since Marine Corps fiscal policy provides that the commander be allotted all the funds necessary to support his unit,¹⁹ the monies to fund the initial issue are held by the using and service units receiving the issue. It therefore remains for the unit commanders to provide JONs to validate the initial issue requisitions held by the supply centers.

¹⁸U.S. Marine Corps, Standing Operating Procedure for Providing an Initial Issue of Repair Parts for New Items of Marine Corps Equipment, MCO 4423.1C, November 17, 1964, pp. 3-4.

¹⁹Letter from Colonel Bruce Hammond, USMC, Director, Materiel Division, Marine Corps Supply Center, Albany, Georgia, March 1, 1966.

Upon receipt of the initial issue cards and listings, the unit assigns document numbers and JONs to all cards, and within five days forwards this information by message to the appropriate supply center, to initiate processing the requisitions.²⁰ Currently, it is taking about ten days to receive JONs from all units supplied by Barstow,²¹ whereas for east coast units the time lag in JON submission runs from two weeks to one month.²² When the necessary data is received from all units, the Supply Center processes the requisitions through inventory.

Shipment of the end items and the support items has been modified several times since the initial issue process was incorporated. Until recently, the support items were sent in several shipments timed to arrive at the proximate delivery time of the end items. The most recent procedure calls for simultaneous shipment of the end items and the support items as a package,²³ a move designed to insure that the unit has available all the required support when it receives the end item. These changes, and further modifications yet to be incorporated, are the focal point of the next chapter.

²⁰ U.S. Marine Corps, Standing Operating Procedure for Providing an Initial Issue of Repair Parts for New Items of Marine Corps Equipment, MCO 4423.1C, November 17, 1964, p. 5.

²¹ Letter from Commanding General, (B820), Marine Corps Supply Center, Barstow, California, March 4, 1966.

²² Letter from Colonel Bruce Hammond, USMC, Director, Materiel Division, Marine Corps Supply Center, Albany, Georgia, March 1, 1966.

²³ U.S. Marine Corps, Standing Operating Procedure for Providing an Initial Issue of Repair Parts for New Items of Marine Corps Equipment, MCO 4423.1C, November 17, 1964, p. 7.

The second subject of the present paper is the
 question of the possibility of a general theory of
 the foundations of mathematics. It is the purpose of this
 paper to show that such a theory is not only possible
 but also necessary. The first part of the paper is
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CHAPTER I

THE FOUNDATIONS OF MATHEMATICS

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CHAPTER V

TOWARD MORE EFFECTIVE SPARE PARTS SUPPORT

A Look Behind

Compared with the long and illustrious history of the Marine Corps, the present system of providing spare parts support for new end items is of fairly recent origin. As late as 1958, there was no precise method for providing an initial issue of spare parts to the using unit.¹ Instead the spares were placed in the supply system to be requisitioned by the using units based on guidance furnished in connection with the end item. In late 1958 a standard operating procedure was promulgated. This provided for more-or-less automatic initial issue of spare parts. The first item to be processed under these procedures was the M10341 tank, introduced in 1959.²

Since that time numerous changes have been made to improve the basic process, generally as a result of significant deficiencies noted at one time or another. For example, in July 1964, it was found that thirty-five end items were in the hands of the user but could not be placed in service because of inadequate spare parts support either in the supply system or in the hands of the using units.³ A review of the existing

¹W. R. Johnson, Major, USMC, Initial Issue of Repair Parts to Fleet Marine Force Units, (an individual research project conducted while a student at the Marine Corps Command and Staff College, February 4, 1965), p. B-1.

²Letter from Colonel Bruce Hammond, USMC, Director, Materiel Division Marine Corps Supply Center, Albany, Georgia, March 1, 1966.

³Interview with Mr. D. L. Bonner, Supply Dept., HQMC, various dates.

methods disclosed that in many cases where the required support was not forthcoming, adequate corrective action could have been taken had the problem area been identified earlier. As a result, procedures were initiated to ensure a closer appraisal of the progress in obtaining the required items in the supply system and getting them to the using units.

Another deficiency which occurred from time to time was the result of spare parts arriving at the using units considerably in advance of the end item, so that when the end item was delivered, some of the support items had either been used or had been misplaced.⁴ To prevent both this and the previous condition, a recent change to the initial issue process provides that spare parts and tools will be shipped together with the end item insofar as practical, to ensure simultaneous delivery of the end item and the support items.⁵

A change in the timing of introducing a new end item was effected about a year ago when the policy concerning support levels was changed. Prior to that time complete range and quantity of mount-out (combat), and garrison operating (peacetime) stocks had to be in the hands of the using units before an equipment could be placed in service. Now it is required only that mount-out stocks be on hand at the full level authorized, and that garrison operating stocks held be "adequate" for sustained operations.⁶ In effect this eliminated the withholding of an item from service when the support deficiencies were peacetime rather than combat-essential items.

⁴Interview with Mr. J. H. Flynn, Jr., G-4 Division, HMC, various dates.

⁵U.S. Marine Corps, Standing Operating Procedure for Providing an Initial Issue of Repair Parts for New Items of Marine Corps Equipment, MCO 4423.1C, November 17, 1964, Change 3.

⁶U.S. Marine Corps, Policy for Support of New Equipments Introduced into the Marine Corps, MCO 4400.32A, March 11, 1965, p. 3.

Introducing a new equipment or system is different today than it was less than ten years ago. Many noteworthy improvements have been made, primarily in the area of initial issues. Yet, as in any process, it is almost certain that there will be many further improvements made in the years ahead in response to some of the deficiencies still remaining in the system today.

Today's Problems

There is no dearth of evidence that the system discussed in Chapters III and IV fails at times to achieve the primary objective of provisioning--i.e., providing the necessary support items where and when needed. An example of this is the new multi-fuel five ton wrecker (M543A2) which is available now at the Supply Centers, yet the required quantities of support items probably will not be available in the supply system for another three months.⁷ Personnel involved in the end item selection and the provisioning processes have differing views as to why this situation has occurred, both of which are probably correct to a degree. Of more importance, however, is what can be done to improve the provisioning aspects of the system.

The Marine Corps Supply Activity, Philadelphia publishes a monthly Provisioning Performance Report which includes a section titled "Significant Events and Problems." For the month of February, 1966, forty-six projects fell in this category (although fifteen of these were due to upgraded priorities of other projects); a year earlier thirty projects were listed in this section.

The reasons for the individual projects being listed are many and

⁷Interview with Major S. G. Tribe, USMC, G-4 Division, HQMC, March 3, 1966.

varied. To be sure, a few causes account for many of the problems, but beyond this the reasons are as many as the projects identified. Currently many of the problems are a direct result of the Vietnam situation, in that certain projects have been set aside to allow more expeditious processing of upgraded projects. Fifteen projects were problems because of this condition in the current report (February). Eliminating these we can see the more-normal problem areas: awaiting documentation, lack of support status data, awaiting stock numbers, awaiting allocation data and updated guidance, and many others.

In view of the multitude of causes for delays in provisioning and initial issue, it appears that no simple course can be charted which will guarantee the timely delivery of needed support items. This view is held by one of the provisioning authorities at the Supply Activity:

It is the opinion of the undersigned based on many years of experience in directing Provisioning operations for the Marine Corps that there is no single universal technique that will permit the successful accomplishment of timely concurrent delivery. Many interacting facets often tend to preclude an orderly accomplishment of the Provisioning process which from the outset could not be detected.⁸

A report concerning methods to ensure timely concurrent delivery of spare parts and tools in the Marine Corps shares this view by stating that "it is a basic tenet that there is no universal technique that will assure concurrent delivery."⁹

While the above views disclaim the possibility of a single technique which will fulfill the provisioning objective, they clearly do not rule out the possibility that a body of techniques can accomplish this goal. In fact

⁸Letter from Mr. Bernard Snyder, Deputy Director, Provisioning Division, Marine Corps Supply Activity, Philadelphia, March 16, 1966.

⁹National Security Industrial Association Subcommittee, Practical Methods of Insuring Concurrency of Parts Delivery, a study of alternative methods to insure concurrent delivery of spare parts for Marine Corps equipment, July 1, 1963 (from the files of the Marine Corps Supply Activity, Philadelphia).

the present system does just that--to a degree. It can however be improved, and in the remainder of this chapter possible improvements will be charted in two areas: first, changes to the present system to provide earlier provisioning and initial issue actions; second, a substantially altered system of introducing a new end item which would facilitate more timely spare parts support and better provisioning decisions.

The Short-Run Approach

Earlier Provisioning Action

The sample Provisioning Performance Schedule discussed in Chapter IV provides an average of 205 days between the receipt of complete technical documentation and the delivery of the first end item, with determination of the range and quantity of items being made in the first sixty days of this time period. This leaves normally less than five months for the contractor to produce or buy the desired spare parts if concurrent delivery is to be achieved. If there is a delay in the receipt or approval of the documentation, this time frame is compressed accordingly since production of the end items will proceed as planned. The end result can well be late delivery of the spare parts, especially if the contractor does not receive the Repair Parts Order until after he has made his last buy of parts for production.

This situation would not be a major problem were it not for the frequency of late documentation receipt or acceptance. In the "Significant Events and Problems" category of the February 1966 Provisioning Performance Report, ten of the thirty-one projects not connected with changes in priorities were identified as "awaiting documentation." In the report for the month of January 1965, thirteen of the thirty projects listed were tied to delays connected with documentation. Documentation is and has been a factor in delaying the selection of the support items to be procured, and thus the

The present study was designed to investigate the effects of the
 use of the computer in the teaching of the English language to
 primary school children. The study was conducted in a primary
 school in London and involved 100 children aged 10-11 years.
 The children were divided into two groups: a control group and
 an experimental group. The control group received traditional
 instruction, while the experimental group received instruction
 using a computer program.

1. Introduction

1.1. Background

The use of computers in education has become increasingly
 common in recent years. This has led to a growing interest
 in the use of computers in the teaching of the English language
 to primary school children. The use of computers in education
 has many advantages, including the fact that it can provide
 individualized instruction, which is tailored to the needs of
 each child. This can help to ensure that all children are
 able to learn at their own pace and to receive the support
 they need. In addition, the use of computers can make learning
 more interesting and motivating for children. This can help
 to improve their motivation and to increase their achievement.
 However, there are also some disadvantages to the use of
 computers in education. One of the main disadvantages is
 the cost. Computers and software can be expensive, and this
 can be a problem for schools with limited budgets. Another
 disadvantage is the fact that computers can be distracting.
 Children can be tempted to play games or to surf the internet
 instead of focusing on their work. This can lead to a decrease
 in their achievement. Finally, the use of computers can
 lead to a decrease in the quality of instruction. This is
 because teachers may be less able to provide individualized
 instruction if they are using computers. This can be a problem
 because individualized instruction is one of the most effective
 ways of teaching children. Therefore, it is important to
 investigate the effects of the use of computers in the teaching
 of the English language to primary school children.

delivery of these items. Yet we cannot (under the present system) eliminate the requirements for documentation, since the provisioning decisions depend in a large part on the data contained therein. The alternative appears to be earlier preparation of the documentation to permit earlier provisioning action.

Current end item contracts normally provide for submission of complete documentation within sixty days after acceptance of the pre-production model.¹⁰ This allows for the documentation to incorporate all design changes growing out of the service test of the pre-production model. Since the pilot models likewise receive considerable testing and modification prior to being declared acceptable for Marine Corps use, the design changes arising during test of the pre-production model are normally relatively minor. In view of this, documentation based on the pre-production model as built normally will not differ significantly from documentation based on the pre-production model as accepted. Thus if documentation were prepared from the design of the pre-production model, the provisioning process could commence several months earlier than is now the case.

Specifically, I would have documentation submitted as soon as possible after the pre-production model is delivered, and the provisioning conference held twenty days after acceptance of documentation (as now) to determine the tentative range and quantity of spare parts to be procured. A Repair Parts Order for these items would be submitted to the contractor, subject to revision as indicated by design changes made during testing of the pre-production model. After approval of the pre-production model, a provisioning review conference could be held to assess the impact of major design changes growing out of the test process. This procedure would allow

¹⁰Interview with Mr. D. L. Elmore, Supply Department, HMC, March 18, 1966.

for the Repair Parts Order to be in the hands of the contractor prior to approval of the pre-production model, so that the requirements for parts for both spares and for production could be incorporated into one order to the subcontractors--presumably at more favorable terms than several smaller orders.

Three conditions which may arise during testing of the pre-production model which could mitigate the value of an early parts order are major and minor design changes, and higher than expected usage for certain parts. Where higher than anticipated usage factors are encountered, the provisioning review conference would determine the additional quantities of spare parts needed and would submit these to the contractor as a supplement to the earlier Repair Parts Order. In those instances where a minor design change occurs, the contractor would merely substitute the replacement item for the original item as he will do in his order of parts for production of the end items. If a major design change is made, it might be necessary to reevaluate the range and quantity decisions at the provisioning review conference; however, the additional effort involved in those cases is overshadowed, I feel, by the resultant increased timeliness of spare parts delivery for all equipment programs.

In response to an inquiry on the feasibility of tentative selection of SMR codes and the range and quantity of items concurrent with test and evaluation of the pre-production model, a Marine Corps Supply Activity provisioning authority had this to say:

Although on the surface it would appear that the selection of maintenance items could best be accomplished as a part of T&E, the validity of the SMR coding would be compromised by non-acceptance of the pre-production model and thus the time and effort devoted would in effect detract from efforts that could have been expended on other equipments. . . . The same comment as indicated above applies to the selection of the range of items since in effect the

The following table shows the results of the survey conducted in 1961, and the results of the survey conducted in 1962. The table shows the results of the survey conducted in 1961, and the results of the survey conducted in 1962.

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assignment of SMR codes constitutes the selection of maintenance items.¹¹

In effect he is saying that in those instances where major design changes are not effected during testing, the method outlined above would be feasible. Again, I feel the increased timeliness of spare parts delivery in most programs justifies increased effort in those programs where major design changes would occur during evaluation of the pre-production model.

Earlier Initial Issue Action

As noted in the early part of this chapter, most of the refinements to the overall support processes have historically been made in the area of initial issues. Each has been made with the object of attaining more timely spare parts support for the new equipment, yet as late as last year end items were arriving at the using units prior to their support items. To alleviate this situation, package shipment of spare parts with the end items has been directed and is now being instituted by the Supply Centers.

One further problem in connection with initial issues was discussed in Chapter IV--i.e., delaying the processing of initial issues until appropriation data is received from all using units. This problem was the subject of an Individual Research Project at the Marine Corps Command and Staff College last year, and it was also the subject of a thorough review by the Commandant two years ago.

The Individual Research Project compared the advantages and the disadvantages of the current allotment system administered by the using units with a regular allotment system administered by the Supply Centers, and an open allotment system administered by the Supply Centers. It was

¹¹Letter from Mr. Bernard Snyder, Deputy Director, Provisioning Division, Marine Corps Supply Activity, Philadelphia, March 16, 1966.

concluded "that the administration of funds used for providing initial issues of repair parts should be handled by the Supply Center under a regular allotment method."¹²

The review of the present system two years ago resulted in reaffirmation of support for the fiscal policy in effect. According to the Fiscal Director of the Marine Corps this policy is set up primarily to let the commander know how much money he has to work with, and to support long-range aims of an integrated system of expenditure and inventory control in the hands of the commander. In view of these aims, the Fiscal Director stated that he has no intention of changing present fiscal procedures as they relate to initial issues.¹³

Since any change in fiscal procedures is unlikely in the near future, any effort to mitigate the delay encountered in processing initial issue requisitions must presume adherence to current fiscal procedures. I believe that the problem can not only be mitigated, but eliminated, by commencing the procedures related to requisitions early enough to allow the appropriation data to reach the Supply Center by the time the end item is "ready for issue."

Under the present procedures outlined in Chapter IV, when an equipment or system is "ready for issue," Headquarters Marine Corps directs the Supply Activity to release initial issue decks and listings. By the time the using units receive the cards and submit job order numbers to the Supply Center ten days to a month has elapsed, yet without this data the requisitions cannot be processed. This situation could be alleviated by

¹²W. R. Johnson, Major, USMC, Initial Issue of Repair Parts to Fleet Marine Force Units, (an individual research project conducted while a student at the Marine Corps Command and Staff College, Feb. 4, 1965), p. 10.

¹³Interview with Mr. J. F. Wright, Fiscal Director of the Marine Corps, March 18, 1966.

having the Supply Activity release the requisitions and listings thirty days prior to the projected "ready for issue" date, so that when Headquarters Marine Corps declares the item "ready for issue," the completed requisitions would be in the hands of the Supply Center and could be processed without delay.

Two objections have been offered to this proposal: first, there are frequently last minute changes in the "ready for issue" date; second, price changes occurring subsequent to release of the requisitions would not be reflected until the actual processing of the requisitions. The first objection is quite true, but this in no way would detract from the proposed change. If the date were delayed, it would give the Supply Center more than thirty days to receive the required fiscal data; and if the date were advanced, we would be in at least as good a position as we are now, if not better. In either case, the requisitions would not be processed until the end item were declared "ready for issue" by Headquarters Marine Corps regardless of when it occurred.

As for price changes, the current initial issue procedures provide for price changes in that the Supply Center goes back to the receiving units for additional funds as needed.¹⁴ The earlier the cards are released the greater could be the need for supplemental funds, yet the delay in requesting additional funds is minimal compared to the delay now encountered, and would not occur in the majority of cases at all. With this in mind the prospect of increased timeliness of initial issues for all end items resulting from earlier processing of requisitions appears to be a goal worthy of achieving.

¹⁴U.S. Marine Corps, Standing Operating Procedure for Providing an Initial Issue of Repair Parts for New Items of Marine Corps Equipment, MCO 4423.1C, November 17, 1964, p. 6.

The Long Range Approach

To determine what the ultimate framework of Marine Corps provisioning should be, numerous key personnel at Headquarters Marine Corps in the Supply Department and the Technical Branches, G-4 Division were asked how the present procedures could be significantly improved. Almost without exception the answers received indicated a need for more precise information upon which to base provisioning decisions, and a need for provisioning to commence during the equipment development process. The concept outlined briefly in this section is largely the product of the responses received to the above question, and a study of various provisioning procedures utilized in other services at the present time. The discussion is oriented to the procurement and testing of an end item by the Marine Corps; however, the concept is equally adaptable to Marine Corps participation in the development of equipment by another service or procurement of equipment from another service.

Deficiencies of the Present System

The history of Marine Corps provisioning presents a continuous series of cases wherein the support items have not been available in sufficient time to allow timely introduction of the end item. Efforts to improve the system have made considerable inroads into the problem areas, and the procedures cited earlier in this chapter could yield further gains in this effort. Still we are left with a system in which the bulk of the provisioning effort takes place in the last year of a four to six year cycle. Key personnel involved in all phases of equipment introduction (planning, selection, procurement, and provisioning) were nearly unanimous in the opinion that provisioning needs to be started during the development of the equipment if full benefit is to be achieved from the efforts involved.

Another deficiency noted by several personnel, including the Quartermaster General, is the failure of the present test and evaluation process to generate sufficient maintenance information upon which to base sound provisioning decisions. Presently the range of repair parts selected is based on the contractor's recommended repair and overhaul rates, known failure rates of similar items, usage data compiled during testing, and the judgment of the provisioners. Each of these can lead to poor decisions. For example, since the Marine Corps normally does not utilize maintenance teams at the contractor's plant it cannot verify the manner by which failure rates were established. Second, usage data from similar equipment has often been more misleading than enlightening. Third, test usage data is inconclusive unless the test models have been given the equivalent of lifetime usage under normal field conditions--a near impossibility. Fourth, the judgment of the provisioners is like judgment throughout the universe --indispensable but not infallible.

A Plan for Timely Spare Parts Support

To devise a system which eliminates both of the deficiencies noted above, we cannot merely take the present system and rework it, for this has already been done repeatedly with only limited success. What is needed is a fresh approach which makes the most of the time span required to introduce a new equipment, and one which utilizes the test and evaluation process to generate not only an approved design but also sufficient data about that design to result in improved provisioning decisions.

The first element of the desired system is fuller utilization of the time involved--i.e., earlier commencement of provisioning. The argument presently presented against earlier provisioning is that throughout the process, until approval of the pre-production model, changes are being

generated which may have an impact on the provisioning decisions. This is true because the manufacturers of the pilot models and the production items may be different firms, and because more widespread testing of the pre-production models reveals flaws previously unnoticed.

To permit earlier provisioning then, we have to eliminate or reduce those changes which occur to the end item after the design is approved for Marine Corps use. The procedures outlined in the previous section of this chapter for handling design changes during testing of the pre-production model can be applied here as well. This leaves us with the changes that are attributable to imperfect duplication of the approved pilot model, which can be eliminated to a large degree by having the same contractor produce both the advanced pilot model and the production items. In other words, when the general design of the new equipment has been formulated (from experimental or early pilot models), proposals should be invited for construction of both the advanced pilot models and the subsequent production items. In this manner the experience gained in developing the approved pilot model can be carried over to production of the pre-production models. This would ensure that the pre-production models do in fact portray the approved pilot model, so that changes in design after approval would be limited to the items noted during extensive service testing of the pre-production models. Thus in effect we could commence provisioning on the basis of the information available from the approved pilot model, several months earlier than now possible.

The second element of the desired system is more precise information upon which to base provisioning decisions. This can quite readily be achieved through maintenance evaluation of the equipment during or at the conclusion of test and evaluation, a procedure in general use at the Army

Tank-Automotive Command (ATAC) and certain other equipment selection commands.¹⁵ Maintenance evaluation consists of a detailed disassembly of the equipment to identify what the maintenance significant items are and at what level each maintenance task can be performed. Ideally it should be performed by operational maintenance personnel experienced in field maintenance procedures so that a clear picture can be formed concerning the availability of skills, manpower, and tools in the using units to perform each maintenance task.¹⁶ This enables the provisioners to more effectively select the range of repair parts and tools needed to support the end item, and to determine at what echelon of maintenance each maintenance task can be most efficiently performed.

Selection of the maintenance significant items and identifying at what level the maintenance should be performed constitutes the bulk of the provisioning decisions. Once these are accomplished the remaining tasks presently performed at the provisioning conference can be achieved in a minimum of time and with a minimum of documentation, prepared from the approved pilot model. In effect then, we have moved the provisioning conference forward to a point of time in close proximity to the formal adoption of the equipment for Marine Corps use, while at the same time acquiring more and better data upon which to base the provisioning decisions.

The net result of the system outlined above is that we have accomplished what we set out to achieve, and more. Not only does it provide for earlier provisioning to ensure timely delivery of spare parts, and more detailed data upon which to base provisioning decisions to ensure more

¹⁵Interview with Major J. G. Tribe, USMC, G-4 Division, HQMC, March 3, 1966.

¹⁶Interview with Maj. Gen. F. R. Tyler, Quartermaster General of the Marine Corps, March 22, 1966.

accurate decisions, but it also would result in earlier introduction of the end item. This is so because there is presently a significant time span between approval of the pilot model and commencement of manufacturing the pre-production models due to the mechanics involved in awarding a new contract--invitations to bid, evaluating the bids, orientation of the selected contractor, etc. Under the proposed system the contract for the pilot model and the production items is one and the same, so the contractor can go directly to production of the pre-production models as soon as the pilot model is approved. The result is earlier production, approval and delivery of the end items, a goal itself worthy of considerable effort to achieve.

Summary

The system I have outlined is sketchy, and no doubt there are many difficulties to be overcome. The benefits to be gained, however, are such that it is unlikely that such a system will not be forthcoming in the years ahead. In addition, it is in accord with the new concept of Integrated Logistic Support in that it provides an earlier identification of the maintenance requirements of a new equipment, and provides more precise data upon which to project the lifetime support requirements of an end item. It may not be the shortest way to our destination, but an earlier start cannot help but result in an earlier achievement of the goal of providing the support necessary to maintain the equipment in the field.

CHAPTER VI

CONCLUSION

In a statement before the Senate Committee on Armed Services, and the Defense Subcommittee, Senate Committee on Appropriations on the fiscal year 1966 budget, the Commandant of the Marine Corps said:

We are resolved that every Marine sent into battle shall have the best arms and equipment we can provide. Consequently, our research and development effort is directed toward the acquisition of those material items best suited to the execution of our operational tactics.

He later said that "development and procurement actions are only meaningful, however, when the hardware is in the hands of the troops. . ."¹

Getting a new equipment or weapons system into the hands of the troops is indeed no easy task, as we have seen. It involves the coordinated planning and execution of numerous processes by a multitude of activities and personnel over a considerable period of time. And in the end, the equipment still cannot be placed in service unless provisioning has provided the necessary support items in the proper place at the proper time.

Summary

Chapters I and II examined the framework in which provisioning takes place. The policies established by the Department of Defense and the Marine Corps were examined in Chapter I for the overall guidance and

¹U.S., Department of the Navy, Budget Digest, Fiscal Year 1966, NavSO P-1355, November 30, 1965, pp. 23-24.

THE

REPORT

OF THE
COMMISSIONERS OF THE
LAND OFFICE
IN RESPONSE TO A RESOLUTION OF THE
HOUSE OF COMMONS, PASSED IN
MAY 1871, RELATIVE TO THE
LANDS BELONGING TO THE
CROWN, AND TO THE
LANDS BELONGING TO THE
PEOPLE.

IN TWO VOLUMES.
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parameters which would channelize the provisioning effort, and the responsibilities within the Marine Corps for provisioning were discussed in brief to set up the organizational framework in which the process lives. In Chapter II the discussion centered on the process of equipment development, and the broad support actions which take place in those phases wherein the project becomes a piece of hardware and reaches the using units.

Chapters III and IV detailed the process of providing the necessary support to permit introduction of the end item and its continued support. The planning procedures examined in Chapter III were those which provide both the general guidance (Item Management Plan, Letter of Adoption) and the detailed guidance (Support Concept, Provisioning Guidance Data) for the execution of provisioning by the Supply Activity. In this section, the test and evaluation process was also covered in brief, not because it represents planning as such, but rather because it occurs concurrently with support planning and generates data used in the later support execution.

Determining the nature and quantity of support needed to support an end item, and effecting its delivery with the end item was the subject of Chapter IV. Since these functions are but part of the overall process alluded to in Chapter II, provisioning and initial issue are no more important than support planning or equipment development. Yet insofar as these are the culmination or finalization of the initial support process, these functions are in reality the heart of the entire process.

Chapter V is devoted to improving the system for providing spare parts support. Initially, the historical development of the system was examined to analyze the changes which have occurred and to provide a benchmark against which to measure any future changes. The target throughout the chapter was timeliness, but in the long-run analysis timeliness and effectiveness share the focus. The result is a body of recommendations

designed to improve the support for new end items introduced into the Marine Corps.

Recommendations

Since a major change to a system which has the wide impact of the provisioning process will be hard to institute, recommended changes have been categorized into short-run and long-run plans. This is done not only to present interim and ultimate goals, but also to indicate desirable and more desirable goals.

In the former category, it is recommended that:

1. Provisioning action be commenced prior to the acceptance of the pre-production model (preferably in the earlier stages of this evolution), and that the effects of design changes be resolved at a provisioning review conference to be held after approval of the pre-production model.

2. Initial issue decks and listings be released by the Supply Activity thirty days prior to tentative "ready for issue" date, so that the Supply Centers can have completed requisitions in hand and can commence processing the initial issue when the equipment is declared "ready for issue."

In the long run, it is recommended that:

1. A maintenance evaluation be performed either during or at the end of the test and evaluation of the pilot model, preferably by operational maintenance personnel.

2. The provisioners utilize the results of this maintenance evaluation as the basis for identifying the repair parts to be procured in order to commence provisioning as soon as possible after its completion.

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It is recognized that in any system there are bound to be deficiencies. Those I have identified in this system are certainly not the only ones, or perhaps even the most significant ones. They are significant though from my point of view, and the recommendations cited above in my opinion would help to alleviate some of the problems now encountered in providing timely and effective support for new equipment being put in the field.

It is necessary to have a clear understanding of the
 situation in order to be able to deal with it
 properly. The first step is to identify the
 problem and then to determine the causes of it.
 Once the causes are known, it is possible to
 take steps to eliminate them. This is the
 only way to solve the problem and prevent it
 from recurring.

The second step is to determine the effects of the
 problem. This is done by observing the
 situation and noting any changes that occur.
 The effects of the problem may be direct or
 indirect. Direct effects are those that are
 immediately apparent, while indirect effects
 are those that are felt at a later date.
 It is important to identify both types of
 effects in order to fully understand the
 problem and its impact.

The third step is to develop a plan of action.
 This plan should be based on the information
 gathered in the previous steps. It should
 outline the steps that need to be taken to
 solve the problem and prevent it from
 recurring. The plan should also include a
 timeline for when the steps should be taken
 and a list of the people responsible for
 carrying them out.

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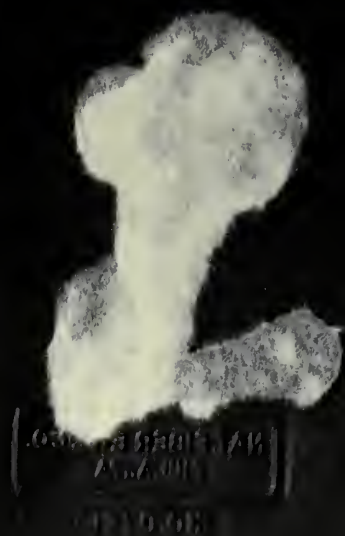
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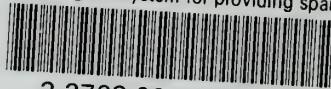
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